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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/085,312 | 02/28/2002 | Mandar B. Sunthankar | RM534 | 7606 |

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| EXAMINER | |
|---|---|
| MCDONALD, RODNEY GLENN | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1753 | |

DATE MAILED: 12/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/085,312 | SUNTHANKAR ET AL. | |
| | Examiner | Art Unit | |
| | Rodney G. McDonald | 1753 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-7,9-16,18-28 and 30-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1,3-7,9-16,18-23,26-28 and 30-37* is/are allowed.

6)☒ Claim(s) *24,25,38 and 39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 24, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vergason (U.S. Pat. 5,037,522) in view of Sablev et al. (U.S. Pat. 3,793,179) and Gorokhovsky (U.S. Pat. 5,380,421).

Vergason teach a "toggle switch" 60 ***(The toggle switch feature of the claims)*** in Figs. 1 and 2. The "toggle switch" comprises a cathode 16 ***(The cathode feature of the claims)*** having a plurality of contacts in the form of terminals 64 and 68 ***(The plurality of contact nodes feature of the claim).*** The terminals are connected to negative poles through switching circuit 60 from a negative DC voltage output. The

switch circuit acts as a "switch" to connect the negative pole of the DC voltage to each terminal 64 and 68 in a time sharing mode. ***(The switch feature of the claims)*** In Fig. 2 for example a first sensor 28 senses the approach of the arc spot, the first flip flop 80 will be set and cause the power switch 90 to connect the negative side of the power supply 58 to the second end 27 of the cathode 16, while a short time period later as determined by the gate delay of the buffers 84, the second flip-flop 86 will be reset and cause the power switch 92 to disconnect the negative side of the power supply 58 from the first end 26 of the cathode 16. Similarly, a signal from the second sensor 29 causes the power switch 92 to connect the first end 26 of the cathode 16 to the power supply 58, and then causes the power switch 90 to disconnect the second end 27 of the cathode 16 from the power supply 58. ***(The time sharing frequency controller feature of the claims)*** The overlap period caused by the gate delay of the buffers 84 and 88, during which both ends of the cathode 16 are connected to the arc power supply 58, insures that there will be no interruption of the connection to the cathode 16 which could cause extinguishment of the arc. ***(The time sharing mode feature of the claims)*** An anode 14 is present. ***(The anode feature of the claims)*** (Column 3 line 57; Column 4 lines 6068; Column 5 lines 1-50)

The differences between Vergason and the present claims are that the anode member is not discussed with the gap and the electrical insulator material is not discussed.

Sablev et al. teach in Fig. 4 a cathode 77 ***(This is understood to be the target material for depositing from)*** attached to a cooling bed 78 ***(This is understood to be***

***the cathode)*** for arc discharge evaporation. The whole of the non-evaporation surface is closed with a metal shield 82. ***(This is understood to be an anode with respect to the cathode since it is a floating metal shield)*** The shield is provided with a slot 83 through which a trigger electrode 84 passes towards the surface of the cathode 77. (Fig. 4; Column 13 lines 32-38; Column 13 lines 60-63) A gap exists on the backside of the cathode to the metal shield 83. An arc moves along the surface of the cathode. (See Figure 4)

The motivation for utilizing an anode member with gap is that it allows for having arc burning take place mainly on the cathode surface. (Column 14 lines 6-7)

Gorokhovsky teach an auxiliary anode 7. (Column 4 lines 59-60) From Figure 1 the anode 7 has a gap between the backside of the cathode and the anode 7. (Figure 1) An electrical insulator is shown in the gap and the gap is partially filled with the electrical insulator. (See Figure 1; insulator is shown as cross hatched area)

The motivation for utilizing an anode around the cathode is that it allows for producing high quality coatings. (Column 2 lines 18-20)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Vergason by utilizing an anode member with gap as taught by Sablev et al. and Gorokhovsky because it allows for having arc burning take place mainly on the cathode surface.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sablev et al. (U.S. Pat. 3,793,179) in view of Gorokhovsky (U.S. Pat. 5,380,421).

Sablev et al. is discussed above and all is as applies above. (See Sablev et al. discussed above)

The difference between Sablev et al. and the present claims is that the metal shield being anode is not discussed. (It should be noted that Sablev et al.'s metal shield is understood to constitute an anode as described above for the reasons above. However Gorokhovsky has been cited to bolster that reasoning.)

Gorokhovsky is discussed above and teach that an anode surrounding the cathode can be utilized. (See Gorokhovsky discussed above) The anode of Gorokhovsky is shown in Figure 1 as auxiliary anode 7. This auxiliary anode 7 bears the same structure and placement as that of Sablev et al.'s anode. (See Figure 1)

The motivation for utilizing an auxiliary anode is that it allows for production of high quality coatings. (See Gorokhovsky discussed above)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Sablev et al. by utilizing the metal shield of Sablev et al. as an anode as taught by Gorokhovsky because it allows for the production of high quality coatings.

***Allowable Subject Matter***

Claims 1, 3-7, 9-16, 18-23, 26-28 and 30-37 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1 and 3-6 are indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the constant contact mechanism with a rotating switch pole.

Claim 7 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the current switching means further comprising a variable speed motor rotating a disc means having a conductive segment and a nonconductive segment, wherein the conductive segment alternately electrically contacts a contact node means.

Claims 9-12 are indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including wherein the rotating cathode current source contacts each fixed electrical contact hub to provide a momentary overlap of current between a pair of fixed electrical contact hubs before directing all the current to the next member of the pair of fixed electrical contact hubs, thereby causing the arc to be steered by the movement of current amongst the plurality of electrical contacts in a continuous manner without interruption.

Claim 13 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including wherein the rotating cathode current source contacts each fixed electrical contact hub to provide a momentary overlap of current between a pair of fixed electrical contact hubs before directing all the current to the next member of the pair of fixed electrical contact hubs, thereby causing the arc to be steered by the movement of current amongst the plurality of electrical contacts in a continuous manner without interruption; wherein the rotating

cathode current source further comprises a disc having a peripheral contact edge, said edge having a conductive and a nonconductive segment; wherein the rotating cathode current source further comprises a central shaft supplying the cathode current to the conductive segment; and wherein a variable speed motor rotates the rotating cathode current source.

Claim 14 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including wherein the reciprocating cathode current source sequentially contacts each fixed contact hub to provide a momentary overlap of current before directing all the current to the next fixed contact hub to be contacted, thereby causing the arc to be steered by the movement of current between the plurality of cathode electrical contacts in a continuous manner without interruption.

Claim 15 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including a plurality of cathodes each having a plurality of electrical contacts; a switching cathode current source to provide an arc simultaneously to each cathode; said switching cathode current source having a separate switch for each cathode; and wherein the switching cathode current source contacts a first and a second electrical contact on each cathode to provide a momentary overlap of current between them before directing all the current to the next contact in line to be contacted, thereby causing several arcs each to be steered by the movement of current between the plurality of cathode electrical contacts on each cathode in a continuous manner without interruption.

Claims 16 and 37 are indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the cathode body being positioned within said insulator member and said cathodic arc target being positioned in electrical contact with said cathode body, a gap between the cathode body and the insulator member, and a gap between the cathodic arc target and the insulator member; said insulator member cross-section having a "C" shape, with a pair of ends aligned with a plane of the target erosion surface; said cathode body having a back side; and a magnet mounted to the back side so as to face the insulator member.

Claim 18 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including each cathode having a plurality of electrical contacts; a cathode current controller; said cathode current controller having a current input, a plurality of current outputs, a logic module to control desired combinations of inputs to outputs; and wherein the cathode current controller for each cathode sequentially contacts a first and a second electrical contact to provide a momentary overlap of current between them before directing all the current to the second electrical contact, then repeating the process to the next in line to be contacted, thereby causing an arc on each cathode to be steered by the movement of the current between the plurality of cathode electrical contacts in a continuous manner without interruption.

Claim 19 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the striker

assembly comprising an electrically insulating solid core having a conductive outer surface; the conductive outer surface having a physical contact with the target; a switch connected between the striker's conductive outer surface and a source of a different potential than the cathode; wherein momentary closure of the switch causes a current flow through the conductive outer surface, thereby depleting the conductive outer surface and creating a spark to initiate an arc to an anode; and wherein the target re-coats the striker during a cathodic arc deposition process.

Claim 22 is indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including an arc to discharge continuously between the cathode and the anode; a target mounted to the cathode and having an erosion surface; and the erosion surface having a pattern of grooves, thereby causing a pattern of vapor flux to focus on a workpiece.

Claims 20, 21, 23, 26-28, 30-36 are indicated as being allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including not utilizing an arc sensor for performing arc discharge.

***Response to Arguments***

Applicant's arguments filed 10-12-04 have been fully considered but they are not persuasive.

In response to the argument that Sablev's metal shield is not an anode, it is argued that Sablev's metal shield is anode with respect to the cathode. To further bolster this argument Gorokhovsky has been cited showing an identical metal shield but Gorokhovsky refers to the metal shield as an "auxiliary anode". The primary anode is

item 8 in Gorokhovsky. This teaching is believed to support the Examiner's position that Sablev's metal shield functions as an anode. (See Sablev and Gorokhovsky discussed above)

This action will be made NON-Final based on the newly cited reference.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
December 14, 2004